

**BY ORDER OF THE COMMANDER
45TH SPACE WING**

45TH SPACE WING INSTRUCTION 91-204

27 JUNE 2009

Safety



**LAUNCH VEHICLE TOXIC
PLUME/DISTANT FOCUSING
OVERPRESSURE INSTRUCTION FOR ON-
BASE PERSONNEL**

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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(Lt. Col. Loretta Kelemen)

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This instruction supplements the 45th Space Wing Instruction 91-206, Danger Area Information Plan, (45 SWI 91-206) and the Cape Canaveral Air Force Station Comprehensive Emergency Management Plan (CEMP) 10-2, Vol I. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 37-123 (will convert to AFMAN 33-363), Management of Records, and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) located at <https://afrims.amc.af.mil/>

SUMMARY OF CHANGES

This revision expands upon the Distant Focusing Overpressure (DFO) hazard and updates some terminology. It also improves upon the scripted announcements for both toxic dispersion and DFO.

1. General Policy.

1.1. The exhaust plume from solid rocket motors (SRM) contains hazardous materials (primarily hydrogen chloride, an irritant gas). In case of a catastrophic failure of a launch vehicle early in flight, rocket fuel and oxidizer residues (e.g., Aerozine-50, nitrogen tetroxide and their combustion products) may also be present. Under certain meteorological conditions, these materials may drift over Cape Canaveral Air Force Station (CCAFS) in concentrations greater than health standards permit.

1.2. On-base personnel within the forecasted Potential Hazard Corridor (PHC) and/or Emission Hazard Corridor (EHC) for a given launch will be provided adequate shelter to ensure they are not exposed to hazardous concentrations of these materials. Employees with known respiratory disorders who work in areas inside the predicted PHC/EHC will be relocated to an area outside the PHC/EHC during launches.

1.3. In the case of a catastrophic failure of a launch vehicle resulting in a significant explosion, if certain meteorological conditions are prevalent, the emanating shock waves may be turned back towards the ground resulting in distant focusing overpressure (DFO). The focusing of these waves can produce increased overpressures at various locations resulting in window breakage and personnel injury.

1.4. On-base personnel in facilities that are within an area of increased risk from DFO will be instructed to move into an interior part of the facility away from windows approximately 5 minutes prior to T-0.

1.5. All personnel must be protected from toxic plume and DFO hazards during launches from CCAFS and/or Kennedy Space Center (KSC).

2. Purpose. This instruction establishes procedures to ensure that all CCAFS personnel and visitors are protected from possible exposure to hazardous materials contained in the exhaust plume or hazardous elevated overpressures resulting from any vehicle launched from either CCAFS or KSC.

3. Structure. This instruction covers required employee education, employee notification during launches, relocation of employees with known respiratory disorders, sheltering personnel (employees, visitors, and distinguished guests) on-base, and the responsibilities for the procedures provided in this instruction.

3.1. Employee Education. According to AFI 90-821, *Hazard Communication*, and the Hazard Communications (HAZCOM) Standard (29 CFR 1910.1200), all organizations at CCAFS will educate their employees concerning hazardous materials they may be exposed to on the job. This includes toxic plume/DFO awareness training for the entire CCAFS work force regarding the hazards of a launch mishap. Therefore, as part of the employee's initial in-processing and training, supervisors will ensure personnel are trained on the contents of this instruction. Contractors operating on CCAFS will educate employees in accordance with their contractual obligations and will be responsible for their own employee health and safety programs.

3.1.1. Once a new employee has received training, the supervisor will document this training in the employee's personnel records. In addition, supervisors will ensure employees know where their assigned launch shelters are located for their place of duty along with what Aural Warning Zone (AWZ) it is located within, and will update the training as changes occur.

3.2. Employee Notification During Launches. 45 SW/SE will evaluate the potential for toxic plume and DFO formation based on current meteorological conditions and Range Safety physics models. 45SW/SE will determine if any CCAFS/KSC areas are within the predicted PHC/EHC and/or an area of increased risk from DFO.

3.2.1. **Scheduled Launch Announcement.** Cape Support will broadcast Message 1 (Attachment 1) every 4 hours (i.e., twice per shift) starting 2 days prior to the scheduled launch, or later if the launch date is still classified at that time. On launch day, Cape Support will broadcast Message 1 via Cape Aural Warning System (CAWS) at L-242 minutes and L-182 minutes. Cape Support will contact the Support Superintendent of Range Operations (SSRO) before each broadcast to avoid conflicting with operational announcements. This message alerts the CCAFS population of the upcoming launch and potential need for launch shelters.

3.2.2. **Launch Shelter Identification Announcement.** If specific areas of CCAFS fall within the predicted PHC/EHC, and/or an area of increased risk from DFO, 45 SW/SE will advise Cape Support to broadcast applicable portions of Message 2 (Attachment 2), at L-122 minutes, L-97 minutes, and L-72 minutes. Before the first announcement, Cape Support will contact the SSRO for clearance to broadcast Message 2 on this schedule. If 45 SW/SE requires announcements on a different schedule, Cape Support will contact the SSRO before each broadcast for clearance.

3.3. **Relocation of Employees with Known Respiratory Disorders.** All personnel on CCAFS with documented chronic respiratory disorders, (e.g., emphysema, asthma, lung disorders, etc.), who work in areas within the predicted PHC/EHC, will relocate to a facility/location that is not encompassed by the predicted PHC/EHC, when directed by Message 2 starting at L-2 hours. This relocation will be completed no later than L-1 hour. Message 2 will list the affected areas, and therefore any relocation should be accomplished accordingly.

3.3.1. Employees being treated for, or diagnosed with, chronic respiratory illnesses will notify their supervisors. Supervisors will ensure these employees are notified of the launch and released for relocation as directed.

3.4. **Sheltering Personnel.** All employees and visitors on CCAFS within the PHC/EHC and/or an area of increased risk from DFO will be provided adequate shelter, or will be required to relocate to another location to ensure they are not exposed to hazardous chemical concentrations at levels that may impair health or glass breakage from elevated overpressure that may cause injuries resulting from the launch or catastrophic failure of the launch vehicle.

4. Responsibilities.

4.1. **Identifying and Certifying Buildings as Launch Shelters for Mitigation of Toxic Hazards.** Buildings on CCAFS that meet the protection requirements for approved launch shelters have been identified. Additional buildings will be tested and designated as launch shelters as specified by 45 SWI 91-203, *Launch Shelter Certification Process*.

4.1.1. A current listing of approved launch shelters can be provided by contacting 45 SW/SE. **Note:** This shelter list is continually under revision and will be updated on a regular basis.

4.2. **Launch Shelter Procedures for Mitigation of Toxic Hazards.** Facility Managers will establish procedures that prepare a certified launch shelter for launches. These procedures must address, as required, closing all doors and windows and turning off ventilation systems, which draw air from the outside. Specific guidance on developing launch shelter procedures can be found in 45 SWI 91-203.

4.2.1. During duty hour launches, all Facility Managers for buildings designed as launch shelters will be considered as launch essential and must ensure that their building is available for shelter.

4.2.2. During non-duty hours, shelters that would normally be unoccupied during the launch period need not be opened merely for shelter purposes and the Facility Manager or representative is not considered launch essential.

4.2.3. During launch operations when a shelter is opened (unlocked), a responsible person must be designated to ensure that all shelter procedures are effectively implemented for that facility.

4.2.4. All organizations must ensure that their employees know where appropriate launch shelters are located for their place of duty and have a clear understanding of the AWZs (see Attachment 8). Supervisors must ensure employees know where their primary and alternate shelters are located for both normal duty hours and other than normal duty hours, or if the primary or alternate shelter is not available for the planned launch period.

4.2.5. Shelter activation will be based on real-time meteorological data and Range Safety physics models. 45 SW/SE, in coordination with Bioenvironmental Engineering, will continue to evaluate conditions and confirm which CCAFS areas are within the PHC/EHC.

4.3. Real-Time Notification.

4.3.1. After 45 SW/SE, in coordination with Bioenvironmental Engineering, has determined affected areas, they will advise Cape Support to broadcast applicable portions of Message 3 (Attachment 3), via CAWS, at L-57 minutes, L-32 minutes, and L-17 minutes. Before the first announcement, Cape Support will contact the SSRO for clearance to broadcast Message 3 on this schedule; if 45 SW/SE requires announcements on other than the above schedule, Cape Support will contact the SSRO before each broadcast for clearance.

4.3.2. Upon receipt of Message 3, each Facility Manager in designated/approved launch shelters in affected areas will secure their building in accordance with established procedures. Organizational Commanders and/or managers, or their representative, in each facility will ensure that their employees are following the announcements as they are being conveyed via CAWS.

4.3.3. Personnel on CCAFS will proceed to their assigned shelters, or identified evacuation point, as dictated by the broadcast message. It is not necessary at this time to enter and remain in the shelter; that is, employees may observe the launch from areas immediately outside their shelter, as long as they can enter and secure the shelter without delay when necessary.

4.3.4. In case of catastrophic failure of the launch vehicle in the launch area, Cape Support, upon direction from 45 SW/SE, will broadcast Message 4 (Attachment 4) as a precautionary measure, via CAWS, and will repeat it 10 and 20 minutes after the accident. All affected personnel, as designated by Message 4, will enter their shelter at once. Each Facility Manager will ensure their shelter is secure with all doors and windows closed. Ventilation systems will be secured in accordance with the pre-

approved facility launch shelter procedure checklist. Cape Support will contact the SSRO for clearance to broadcast Message 4 on this schedule.

4.3.5. If the exhaust plume affects specific areas of CCAFS, 45 SW/SE will advise Cape Support to broadcast Message 5 (Attachment 5), via CAWS, and will repeat it 10 minutes and 5 minutes before the plume arrives. Before broadcasting, Cape Support will contact the SSRO to avoid conflicting with the Audible Plus Count system or other required operational messages. All personnel in the affected areas will enter their shelter at once. The Facility Manager will ensure the shelter is secured in accordance with the pre-approved facility launch shelter procedure checklist.

4.3.6. When 45 SW/SE, in coordination with Bioenvironmental Engineering and the Launch EOC Director, determines hazardous conditions no longer exist, 45 SW/SE will direct Cape Support to broadcast one of the applicable all-clear messages via CAWS, Message 6 (Attachment 6) the All Clear Announcement (For Personnel Outside Impact Limit Line (ILL)) or Message 7 (Attachment 7), All Clear Announcement. At this time, normal activities may resume, ventilation systems may be restored, and normal access procedures reestablished. **Note:** To determine if a facility is inside the impact limit line prior to launch day, see 45 SWI 91-206 or contact 45 SW/SELR at 494-3287.

4.3.7. After a normal launch with no toxic plume hazard, Message 7 (Attachment 7) should be made no earlier than L+5 minutes to avoid conflict with the Audible Plus Count system. Cape Support will contact the SSRO before broadcasting to avoid conflicting with required operational messages.

4.4. Cape Security Procedures. Cape Security will be posted according to the mission specific Operational Plan and Roadblock Access letter.

4.4.1. Cape Security vehicles that are equipped with public address systems and are on patrol within activated AWZs will be used to inform all personnel of their AWZ and the need to seek shelter. Cape Security personnel should comply with all CAWS announcements.

4.4.2. Cape Security Officers who observe individuals or groups gathering in non-approved areas (e.g., Mobile Service Towers, rooftops, antenna platforms, non-approved launch sheltering areas during sheltering conditions) to watch a launch will direct the individuals to proceed to their approved shelter.

4.4.3. Cape Security Officers will inform the EOC Director of compliance with toxic sheltering announcements when announcements are required. The EOC Director will convey field status to the Mission Support Group Commander who will inform 45 SW/SE of status. This information will be included with 45 SW/SE recommended "go/no-go" for launch.

4.4.4. If required, roadblocks will be established to control access to areas within the EHC, using on-duty security patrols.

4.5. Official Visitor Procedures. Certain categories of individuals who do not directly support launch operations (e.g., distinguished guests, media, contractors, program representatives, and launch team family members), with the concurrence of the Det 1/CC and approval of the 45 SW/CC, will be permitted on CCAFS to view launches. These persons

will be included in all risk analyses and will be assessed against current launch commit criteria as given in EWR 127-1 or AFSPCMAN 91-710.

4.5.1. Organizations who sponsor visitors for launch viewing must ensure that ALL visitors are aware of the following and adhere to section 4.5.1.7:

4.5.1.1. The AWZs provided at Attachment 8.

4.5.1.2. The messages contained in the attachments of this instruction.

4.5.1.3. The need to follow instructions conveyed in each CAWS message.

4.5.1.4. The location of the designated launch shelter or evacuation point, when applicable.

4.5.1.5. If sheltering is required in their AWZ and adequate sheltering is not available, visitors must proceed to an approved alternate viewing location.

4.5.1.6. Visitors with respiratory disorders and children under the age of 15 years are required to go to an unaffected location, when sheltering activities are directed for their affected area.

4.5.1.7. Organizations sponsoring visitors, including distinguished guests and the media, must assign a point of contact (POC) for their visitors. It is the responsibility of the visitor POC to call the RAC at 853-8440 two hours prior to launch, or before departing for their designated viewing location, to verify that no sheltering issues exist and that they can indeed populate their viewing location.

4.6. Launch Essential/Neighboring Operations Personnel Inside Clear Areas. Real-time launch day modeling will be performed to assess DFO and toxic hazards. Based on model output, the 45SW/CC or his designated representative will direct personnel to either evacuate the affected area, seek shelter in an approved launch shelter, or will halt the launch. Launch essential and/or neighboring operations personnel whose duties will necessitate that they remain in place, either in the open or not in an approved toxic shelter (therefore not able to pre-clear from a Potential Hazard Corridor), must abide by the following options:

4.6.1. Have a Range Safety approved post-accident emergency egress capability with egress routes based on real-time toxic modeling.

4.6.2. Be equipped, trained, physically qualified, and certified for use of a Self-Contained Breathing Apparatus (SCBA), the 45 SW Bioenvironmental Engineer approved personal protective equipment (PPE).

STEPHEN D. BUTLER, Colonel, USAF
Vice Commander,

Attachment 1**MESSAGE 1 - SCHEDULED LAUNCH ANNOUNCEMENT**

Cape Support will broadcast this announcement via the Cape Aural Warning System starting at L-48 hours, repeating every 4 hours. This schedule may be delayed if the launch date is classified; in this case, the first announcement will be made as soon as possible after release. On launch day, Cape Support will broadcast this announcement at L-242 minutes and L-182 minutes:

A LAUNCH FROM COMPLEX _____ IS SCHEDULED FOR _____
(Date)

WE WILL USE THE CAPE AURAL WARNING SYSTEM TO ADVISE YOU OF REQUIRED ACTIONS. LAUNCH SHELTERS MAY BE REQUIRED FOR YOUR PROTECTION. APPROVED LAUNCH SHELTERS ARE IDENTIFIED WITH A BROWN SIGN AT THE MAIN FACILITY ENTRANCE. YOUR COOPERATION IS ESSENTIAL TO AVOID PERSONAL RISK OR INJURY.

(REPEAT)

(**Note:** Before each broadcast, Cape Support will contact the SSRO to avoid conflicting with countdown announcements.)

Attachment 2**MESSAGE 2 - LAUNCH SHELTER IDENTIFICATION ANNOUNCEMENT**

*At the direction of 45 SW/SE, Cape Support will broadcast this announcement via the Cape Aural Warning System at L-122 minutes, L-97 minutes, and L-72 minutes.

ATTENTION PERSONNEL IN THE FOLLOWING AREAS AND ALL POINTS IN BETWEEN (EXAMPLE, "AURAL WARNING ZONES 1, 2, 4 AND THE NORTHERN PART OF 5".) THE LAUNCH FROM COMPLEX _____ IS SCHEDULED FOR LIFTOFF AT APPROXIMATELY _____.
(Time)

(*READ THE FOLLOWING TOXIC ANNOUNCEMENT ONLY WHEN INSTRUCTED BY 45 SW/SE*). ALL PERSONNEL WITHIN THESE AREAS MUST IDENTIFY THEIR LAUNCH SHELTER.

PERSONNEL WITH DOCUMENTED RESPIRATORY DISORDERS IN THESE AREAS MUST BEGIN TO RELOCATE TO A FACILITY OR LOCATION THAT IS NOT WITHIN THE AFFECTED AREA. THIS RELOCATION MUST BE COMPLETED NO LATER THAN (*GIVE TIME OF L-1 HOURS.*) IF YOU ARE NOT IN AREAS JUST DESCRIBED, YOU MAY CONTINUE NORMAL OPERATIONS.

(*READ THE FOLLOWING DFO ANNOUNCEMENT ONLY WHEN INSTRUCTED BY 45 SW/SE*). PERSONNEL IN FACILITIES WITHIN THE IDENTIFIED AREAS ARE INSTRUCTED TO (MOVE INTO AN INTERIOR PART OF THE FACILITY AWAY FROM WINDOWS APPROXIMATELY 5 MINUTES PRIOR TO T-0.)

(REPEAT ENTIRE 45 SW/SE INSTRUCTED ANNOUNCEMENT)

*(**Note:** Cape Support will contact the SSRO before the first announcement and before each subsequent announcement on the above schedule.)

Attachment 3

MESSAGE 3 – LAUNCH SHELTER ANNOUNCEMENT

*At the direction of 45 SW/SE, Cape Support will broadcast this announcement via the Cape Aural Warning System at L-57 minutes, L-32 minutes, and L-17 minutes.

ATTENTION PERSONNEL IN THE FOLLOWING AREAS AND ALL POINTS IN BETWEEN (EXAMPLE, “AURAL WARNING ZONES 1, 2, 4 AND THE NORTHERN PART OF 5”.) THE LAUNCH FROM COMPLEX _____ IS SCHEDULED FOR LIFTOFF AT APPROXIMATELY _____.
(Time)

(*READ THE FOLLOWING TOXIC ANNOUNCEMENT ONLY WHEN INSTRUCTED BY 45 SW/SE*). PROCEED TO YOUR DESIGNATED LAUNCH SHELTERS. YOU MUST LEAVE ALL OPEN HANGAR BAYS NOW. LAUNCH SHELTER MANAGER; ACTIVATE YOUR SHELTERS NOW. APPROVED LAUNCH SHELTERS ARE IDENTIFIED WITH A BROWN SIGN AT THE MAIN FACILITY ENTRANCE.”

(*READ THE FOLLOWING DFO ANNOUNCEMENT ONLY WHEN INSTRUCTED BY 45 SW/SE*). PERSONNEL IN FACILITIES WITHIN THE IDENTIFIED AREAS ARE INSTRUCTED TO (MOVE INTO AN INTERIOR PART OF THE FACILITY AWAY FROM WINDOWS APPROXIMATELY 5 MINUTES PRIOR TO T-0.)

(REPEAT ENTIRE 45 SW/SE INSTRUCTED ANNOUNCEMENT)

*(**Note:** Cape Support will contact the SSRO before the first announcement and before each subsequent announcement on the above schedule.)

Attachment 4**MESSAGE 4 - ACCIDENT ANNOUNCEMENT**

In case of a catastrophic failure of the launch vehicle in the launch area and at the direction of 45 SW/SE, Cape Support will broadcast the following announcement via the Cape Aural Warning System, repeating at accident +10 minutes and accident +20 minutes.

ATTENTION ALL EMPLOYEES AND VISITORS AT CAPE CANAVERAL AIR FORCE STATION. YOU ARE IN NO IMMEDIATE DANGER FROM THE _____ ACCIDENT. REPEAT - YOU ARE IN NO IMMEDIATE DANGER FROM THE _____ ACCIDENT. AS A PRECAUTIONARY MEASURE, REMAIN IN PLACE. FOR PERSONNEL IN THE FOLLOWING AREAS AND ALL POINTS IN BETWEEN (*EXAMPLE "AURAL WARNING ZONES 1, 2, 4 AND THE NORTHERN PART OF 5"*), ENTER AND REMAIN IN YOUR LAUNCH SHELTER. IF YOU ARE OUTDOORS WITHIN THIS AREA, GO INDOORS TO AN APPROVED SHELTER NOW. WE WILL PROVIDE FURTHER INSTRUCTIONS BY THE CAPE AURAL WARNING SYSTEM.

(REPEAT)

(**Note:** Before broadcasting, Cape Support will contact the SSRO to avoid conflicting with the Audible Plus Count system or other required operational messages.)

Attachment 5

MESSAGE 5 - TOXIC PLUME ANNOUNCEMENT

In case specific areas of CCAFS are affected by the exhaust plume and at the direction of 45 SW/SE, Cape Support will broadcast the following announcement via the Cape Aural Warning System and will repeat 10 minutes before the toxic plume arrives, 5 minutes before the toxic plume arrives, and as the toxic plume arrives:

ATTENTION PERSONNEL IN THE FOLLOWING AREA AND ALL POINTS IN BETWEEN (*EXAMPLE "AURAL WARNING ZONES 1, 2, 4, AND THE NORTHERN PART OF 5"*) THE EXHAUST PLUME WILL ARRIVE IN YOUR AREA AT APPROXIMATELY _____. YOU MUST BE IN AN APPROVED LAUNCH SHELTER NOW.
(Time)

WE WILL NOTIFY YOU BY THE CAPE AURAL WARNING SYSTEM WHEN YOU MAY LEAVE THE SHELTER. DO NOT, REPEAT, DO NOT ATTEMPT TO LEAVE THE CAPE.

(REPEAT)

*(*Note:* Before broadcasting, Cape Support will contact the SSRO to avoid conflicting with the Audible Plus Count system or other required operational messages.)

Attachment 6**MESSAGE 6 - ALL CLEAR ANNOUNCEMENT (FOR PERSONNEL OUTSIDE THE
IMPACT LIMIT LINE (ILL))**

At the direction of 45 SW/SE, Cape Support will broadcast the following announcement via the Cape Aural Warning system:

THIS IS AN ANNOUNCEMENT FOR ALL EMPLOYEES AND VISITORS AT CCAFS WHO ARE LOCATED OUTSIDE THE _____ VEHICLE IMPACT LIMIT LINES. YOU MAY NOW RESUME NORMAL ACTIVITIES. EMPLOYEES WHO ARE LOCATED INSIDE THE _____ VEHICLE IMPACT LIMIT LINES SHALL REMAIN IN THEIR DESIGNATED LAUNCH SHELTER UNTIL RETRIEVED BY THE LAUNCH EMERGENCY OPERATIONS CENTER ACTIVATION TEAM.

(REPEAT)

(**Note:** Before broadcasting, Cape Support will contact the SSRO to avoid conflicting with the Audible Plus Count system or other required operational messages.)

Attachment 7

MESSAGE 7 - -ALL CLEAR ANNOUNCEMENT

At the direction of 45 SW/SE, Cape Support will broadcast the following announcement via the Cape Aural Warning System:

THIS IS AN ANNOUNCEMENT FOR ALL EMPLOYEES AND VISITORS AT CAPE CANAVERAL AIR FORCE STATION. YOU MAY NOW RESUME NORMAL ACTIVITIES.
REPEAT - YOU MAY NOW RESUME NORMAL ACTIVITIES.

(REPEAT)

(*Note:* Before broadcasting, Cape Support will contact the SSRO to avoid conflicting with the Audible Plus Count system or other required operational messages.)

Attachment 8

CAPE CANAVERAL AIR FORCE STATION AURAL WARNING ZONES

Figure A8.1. Cape Canaveral Air Force Station Aural Warning Zones.

